



Climate change, fisheries, and aquaculture: Trends and consequences for Canadian marine biodiversity

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Abstract:

Climate change, fishing, and aquaculture have affected and will continue to influence Canadian marine biodiversity, albeit at different spatial scales. The Arctic is notably affected by reduced quality and quantity of sea ice caused by global warming, and by concomitant and forecasted changes in ocean productivity, species ecology, and human activity. The Atlantic has been especially impacted by severe overfishing and human-induced alterations to food webs. Climate change, fishing, and aquaculture have all affected, to varying degrees, biodiversity on Canada's Pacific coast. Past and projected trends in key biodiversity stressors reveal marked change. Oceanographic trends include increasing surface water temperatures, reduced salinity, increased acidity, and, in some areas, reduced oxygen. Reductions in Canada's fishery catches (those in 2009 were half those of the late 1980s), followed by reductions in fishing pressure, are associated with dramatic changes in the species composition of commercial catches in the Atlantic (formerly groundfish, now predominantly invertebrates and pelagic fish) and the Pacific (formerly salmon, now predominantly groundfish). Aquaculture, dominated by the farming of Atlantic salmon, grew rapidly from the early 1980s until 2002 and has since stabilized. Climate change is forecast to affect marine biodiversity by shifting species distributions, changing species community composition, decoupling the timing of species' resource requirements and resource availability, and reducing habitat quality. Harvest-related reductions in fish abundance, many by 80% or more, coupled with fishing-induced changes to food webs, are impairing the capacity of species to recover or even persist. Open-sea aquaculture net pens affect biodiversity by (i) habitat alteration resulting from organic wastes, chemical inputs, and use of nonnative species; (ii) exchange of pathogens between farmed and wild species; and (iii) interbreeding between wild fish and farmed escapees. Physical and biological changes in the oceans, along with direct anthropogenic impacts, are modifying Canadian marine biodiversity with implications for food security and the social and economic well-being of coastal communities. To assess the consequences of changes in biodiversity for Canada's oceans and society, it is necessary to understand the current state of marine biodiversity and how it might be affected by projected changes in climate and human uses.

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Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

Climate Change and Human Health Literature Portal

A focus of content

Communication Audience:

audience to whom the resource is directed

Public

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Security

Food/Water Security: Fisheries, Other Marine Productivity

Geographic Feature:

resource focuses on specific type of geography

Arctic, Ocean/Coastal

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Medical Community Engagement:

resource focus on how the medical community discusses or acts to address health impacts of climate change

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

Resource Type:

format or standard characteristic of resource

Review

Resilience:



capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content